1750 METERS: WESTERN UPDATE #61

THE WESTERN NEWSLETTER FOR THE EXPERIMENTER'S BAND (160 TO 190 KHz)

Available for business-size 25 cent SASE's , plus 60 cents per issue (or $7 per year)
from: Jim Ericson, 226 Charles St., Sunnyvale, CA 94086-6063

ACTIVE WESTERN LowFER BEACON STATUS (LIST COMPILED December 3, 1988)

FREQ(kHz)	IDENT	QTH	SKED INFO
163.80	FPV	Granada Hills, CA	24h/7d. See alt. freq. 182.62 kHz.
163.88	M	San Diego CA	24h/7d.
164.00++	JKS	San Anselmo, CA	Freq. Hopping (164, 165, 166, 167 kHz)
164.89	T	Sunnyvale, CA	24h/7d. A2 modulation (+/- 775 Hz). Note QSY.
165.015	TLX	Novato, CA	24h/7d.
165.656	ZV	9 mi. NW of San Simeon, CA	By request.
166.503	C	near Morro Bay, CA	24h/7d.
166.667	H	Descanso, CA	24h/7d.
167.25	AHN	Fallbrook, CA	24h/7d.
169.96	NRE	San Diego, CA	24h/7d
170.40	B	San Ysidro, CA	24h/7d
175.225	MAX	Wheatland, WY	24h/7d CW. BPSK/ASCII by request.
175.703	FAW	Orem, UT	24h/7d.
176.00	HDOMBAY	Morro Bay	24h/7d.
176.26	CO	Glenwood Springs, CO	24h/7d.
176.75	SR	Elgin, OR	24h/7d.
176.85	7FS	Belfair, WA	24h/7d. Back on the air.
177.49	UCP	Saratoga, CA	Daily, approx. 1400 to 1700 UTC.
178.935	ZIR	Southern California?	Recently 24h/7d.
179.0	MPM	Salt Lake City, UT	24h/7d. ASCII/CW alternating 5minutes.
179.750	L	Unknown	Heard in So. Calif. during November.
180.224	F	Los Banos, CA	FSK. By request.
180.80	XU	Sioux Falls, SD	24h/7d. BPSK/CW alternating 5 minutes.
181.17	IZJ	San Gabriel, CA	Daily. Silent 0700 to 1100 UTC.
181.287	MEL	San Jose, CA	24h/7d.
181.682	ISUN	Durant, OK	8-10am, 8pm to midnite CST, 7 days.
182.62	FPV	Granada Hills, CA	24h/7d. See alt. freq. 163.80 kHz.
182.672	G	Palo Alto, CA	24h/7d.
182.88	H2	Descanso, CA	24h/7d.
183.160	PRK	Saratoga, CA	24h/7d.
183.63	PLI	Toluca Lake, CA	24h/7d.
183.95	8 dits	Palo Alto, CA	Intermittent tests . Same QTH as "G".
184.016	EK	Sunnyvale, CA	Intermittent.
184.1	WJ	Simi Valley, CA	Intermittent. Drifts up to 184.7 kHz.
184.32	N3S	Mocksville, NC	Intermittent tests.
184.43	V	Forestville, CA	24h/7d.
184.80	dashes	Mountain View, CA	24h/7d. New Beacon (Scott Mawhinney).
185.0	ZYK	Redway, CA	24h/7d.
185.00	AU	Champaign, IL	0100 to 0600 UTC, 7 days.
185.08	TMT	San Rafael, CA	By request (Steve McGreevy).
185.49	AZ	Tucson, AZ	24h/7d.
186.80	BA	Lancaster, IL	24h/7d.
187.0	ELU	Simi Valley, CA	24h Saturday and Sunday on SSB.
187.252	TEXAS	NW of Ft. Worth, TX	24h/7d.
187.30	UPN	Cincinatti, OH	Occasional.
187.50	DCH	Berlin, MD	24h/7d.
187.59	SM	San Jose, CA	24h/7d.
189.84	R	Nevada Test Site	24h/7d. Previous ident was NTS.
190.4	OHH	Richmond Hill, Canada	Occasional testing.
514.127	U	9 mi. NW San Simeon, CA	24h/7d. Mike Mideke.
522.62	SA	San Rafael, CA	24h/7d. Steve McGreevy.
530.+/- 76	T	Sunnyvale, CA (WA6AJY),A2 mod	24h/7d. Ed Gelinas. Simulcast with T at 164.89 kHz.
1637.44	ER	San Rafael, CA	24h/7d. Steve McGreevy.

2 MORE SASES ON FILE "

(Check means sig logged at EK QTH in November/December Non-Western listings are beacons currently being copied in the West, or they have SASE's on file with us. The four MF beacons at the end of the list are shown for interest, since they are operated by LowFERS...and they ARE getting out!)

MAILBAG: **Arliss Thompson** writes from South Dakota that his new **XU** beacon is on the air! "..I got it running on 180.800 kHz late on the evening of November 27th, when it was about 10 degrees with 40 mph winds and blowing snow. It's BPSK/CCW alternating every 5 minutes. The hour begins with BPSK. Grid square is EN13. I gave **Max Carter** in Wyoming a phone call and he's going to try for it."

Sheldon Remington checked in from Hawaii to report, "Lots of DX'ing lately but not hearing any LowFERS. My thanks to **Cliff, Steve and John** for QSYing down into the Hawaii window. I have at last succeeded in copying all 73 aeronautical NDB's in California and Oregon, and that really makes me scratch my head as to why I don't hear more LowFERS. The seemingly inevitable conclusion is that LowFERS are down by more than the 14 dB that would be expected based on wattage alone. The extra NDB advantage must come from some combination of a site clear of E-field absorbers, and more extensive ground systems. I was all set to put my **HO** LowFER beacon on the air with a 42 foot wood mast, but the mast broke when I was hoisting it. Putting up anything smaller seems a waste of time, so HO may not return at all for awhile. A couple of LowFER reception reports from NDB DX'ers: **Steve McDonald** (V3B4KH of B.C.) copied his first LowFER, **7FS** at 0455 on 9/21. **Jim Hill** (Palos Verdes Estates, CA) has logged **ELU, FPV, H, IZJ, NTS, NVA, PLI, SUK, Z2** and **unidentified beacon ZIR.**" Sadly, Sheldon also noted that his most recent issue of the **NDB DX NEWSLETTER** (#7) will be the last, unless someone steps forward to help with publication. The time drain, plus logistics of copying/mailing have forced him to discontinue this fine publication (the only one of its kind in the world). If you'd like to try your hand at a bit of desktop publishing, get in touch with Sheldon asap.

Joe Woodlock of Illinois writes that he and **Ken Stryker** are at work on the next edition of the NDB Beacon Guide. He also sent along a draft article on LowFERS which most likely will appear in Monitoring Times magazine sometime in early 89.

Brice Anderson (BA, Illinois) reports, "Here are a few notes on LF since early November. **ARK** 177.80 kHz back on the air. **DCH** 187.50 kHz on the air from Berlin, MD. **KRY** can transmit BPSK now. **QYV** 189.88 kHz is on from Donora, PA. **YHO** 182.45 kHz is on from Cincinnati. **1SUN** has QSY'd to 181.682 kHz. And, I am hearing **ARK, KRY, QYV, TH, UPN, WI, XR, YHO, 8LXJ, XR, and 9HDQ.** On November 7th I added several hundred feet of surface ground radials. So far this season, BA has been heard by **9HDQ, UPN** and YHO."

Don Johnson (W9TIF) reports getting his new **AU** beacon on the air in early November (185 kHz, Champaign, IL).

Glen Smith (N6CX, Kenwood, CA) is doing some listening on a newly acquired URM-6A VLF receiver/field strength meter and a 3 foot, 11 turn loop. The receiver was made by Stoddard Corporation, and Glen would appreciate any information on where to obtain an instruction manual.

Fred Spaulding (K1YQP Mountain View, CA) wrote, "Am very interested in experimenting on the 1750m band. I used to do VLF work for the Navy, and currently do AM broadcast work. I have some experience with digital communications and would like to put up an MSK modulation scheme or the like."

Jose Otacilio Pereira De Sousa wrote from Brasil to get a WU subscription. He heard about us via the 73 Magazine article in February. Welcome, Jose!

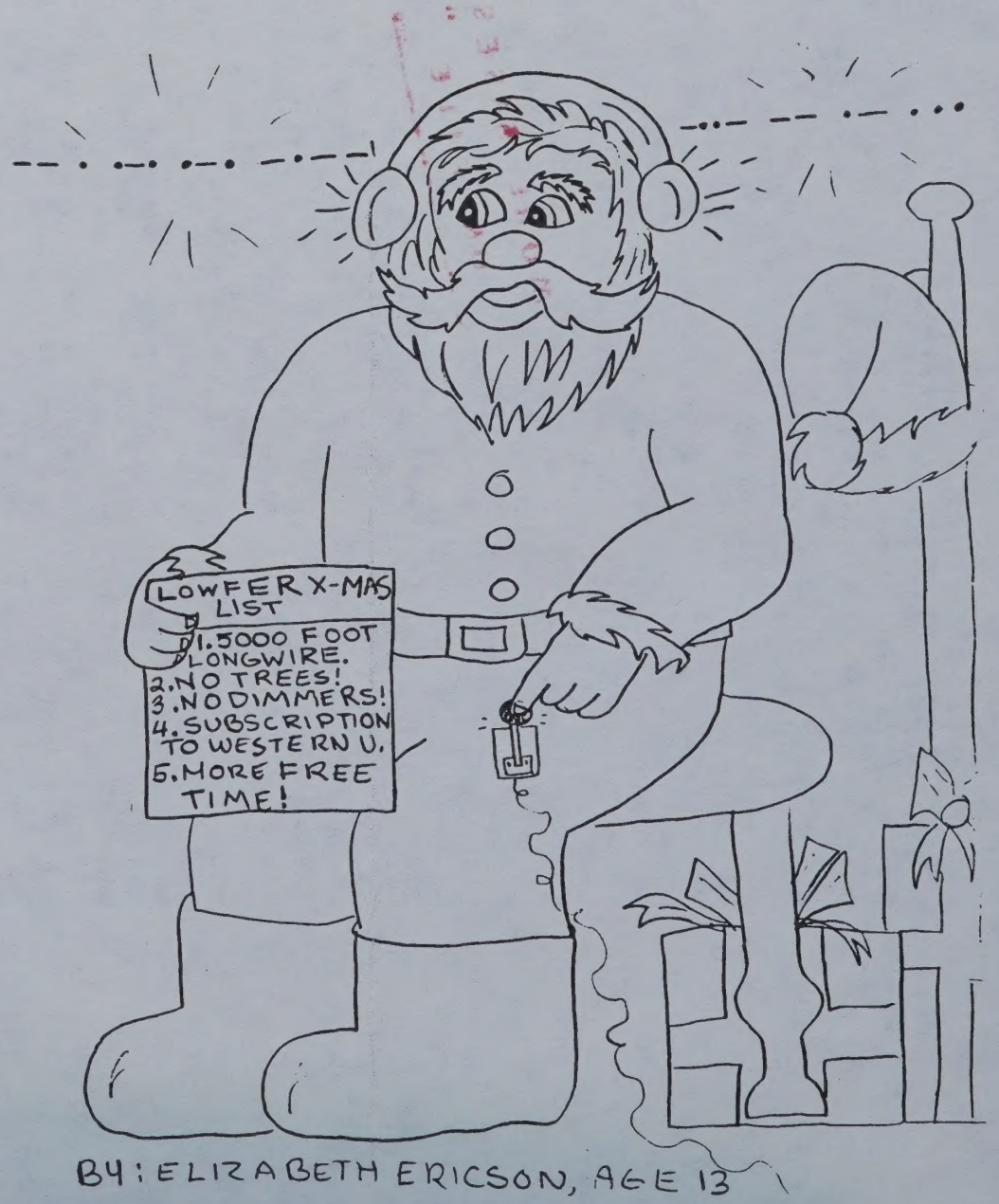
Rick Wright (1SUN, Durant, OK)sent the new sked for his beacon (see listing). He is using a modified Max Carter synthesizer. The reference frequency is derived from KXII TV-12 horizontal frequency. Interestingly, Rick noted that contrary to expectations, he sees absolutely NO frequency shifts when the studio switches cameras. He says, "If there are differences in TV timing standards, it must be showing up after the 6th or 7th significant digit!!! Using a synthesized, external BFO, one can hit a narrow filter (eg., 5 Hz) without error. Tuning is a matter of optimizing the preselector!"

Rick Nickerson (KB6JQU Sacramento, CA) says, "Working on an antenna for my LF beacon. Ident is **R** and freq will be around 186 kHz. I'm using a VFO. Will fill you in on the details when it's up and running."

Mitchell Lee (MEL San Jose, CA) is running a 1.3 watt 160 meter beacon this winter on 1813 kHz sending **KB6FPW/B**. The carriers for both MEL and KB6FPW/B are derived from the same 7.251484 MHz master oscillator. Since automatic beacons are not authorized on 160m, KB6FPW/B only operates when Mitchell is at home (Midnight to 6am minimum, and normally starting between 8 and 10pm, and closing about 7am). KB6FPW/B has been heard via sunrise enhancement by KH6CC, the world's top 160m DXer. It was also heard by Sheldon, NI6E/KH6, the world's top NDB DXer near Hilo, HI. If you hear Mitchell's new beacon please copy the message or ident and send him a QSL card. He is interested in notes concerning fading cycles (both depth and periodicity), your receiver, antenna, and of course, the UTC time/date.

Scott Mawhinney of Mountain View, CA has a new beacon on 184.8 kHz. Ident is a repeating dash. He's being heard as far away as San Diego! The transmitter is a stock LF Engineering model into a roof mounted vertical in the clear. Scott next wants to improve his receive capability.

Frank Cathell (H, H2 San Diego) has been hearing Scott's dasher plus R, PLI, AZ, C, B, M, and ZIR (the mystery beacon).



EK NOTES First, a hodgepodge of last minute notes prior to publication: **Ed Phillips** (IZJ San Gabriel, CA) reports hearing an **L** identifier on 179.750 kHz 11/20. Also, many CA listeners reporting good copy on **ZIR** at 178.935 kHz. This is an unidentified beacon, probably in Southern California. How about somebody in the area taking a few hours with a portable receiver/loop and DF'ing it?

Herb Vanderbeek (G, V) is making subtle noises about getting some Amtor experimentation going on 1750m in the SF Bay Area.

John Seamons (JKS San Anselmo, CA), supposedly frequency hopping 164, 165, 166, 167 kHz, has recently had some outages. About a week ago, I copied him NOT frequency hopping, sitting on 167 kHz. What's happening, John?

My own **EK** beacon has been off the air for the past two weeks because I'm doing some experimental VLF chart recording in support of a propagation project designed by **Mike Mideke.** Mike will doubtless report on the results of his study early next year, either in the **LOWDOWN,** or the **WU** (or both). I'm using a Rustrak recorder which utilizes coated paper in conjunction with a galvanometer pointer that bumps against the paper every second or so, leaving a little black tick mark. It's a marvelous "sampling" instrument, as compared to "pen plotter" type recorders. Very nifty for monitoring signals!

Sam Rappold (ZYK Redway, CA) sent me a tape of his excellent copy of the **R** beacon on 18 November, 27 November, and 30 November.

Late news flash from **Greg Farkas** (AZ Tucson, AZ)...He has a 350 foot longwire (soon to be extended to 1000 feet), and heard **H2** and **B** Sunday morning 12/5! Greg is also hearing **R** and **MPM.** He recently built a longwire antenna tuner (per a **Ralph Burhans** design in Radio Electronics Magazine) and reports excellent results. He also has found a good source for 1500 pF variable condensers (3 sections of 500 pF each): Antique Electronic Supply, 688 W. First Street, Tempe, Arizona, 85281, (602)-894-9503. They are priced cheap at $4.95 each, and Greg says they have plenty in stock!

There is apparently a mistaken impression that the **WU** editorial policy excludes information about Medium Frequency experimentation. There seems to be increasing interest in the broadcast-band Part 15 operation...and with good reason. Antennas are shorter, hence simplifying antenna modeling experiments. Propagation by skywave is much more significant. This issue contains a preliminary article on **MedFERS** (medium frequency experimenters), by **Steve McGreevy**. Subsequent issues will have followup articles on the "how-to" of transmitting and receiving on the broadcast band. As far as I am concerned, the Western Update should adapt to the needs of subscribers. If this goes in the direction of MF work, or whatever, so be it! Somewhere down the line we may have to change the title of this publication from "1750 Meters: Western Update", to something more generic in terms of radio experimentation. I encourage your comments regarding this subject, and the future of WU.

EDITORIAL: Seems like a good opportunity for a short editorial, this being the final issue for 1988. First, many sincere thanks for those of you who took time to write articles and letters for issues published this year! I appreciate how difficult it is to carve time out of the day-to-day melodrama to sit down and write someting for publication.

Financially, the **WU** continues to be solvent. The list of subscribers has grown slowly but steadily to 110, despite my nasty rotten policy of "NO SASE's, NO WESTERN UPDATE"! We currently have $635 in the kitty. An average issue costs me about $60, so we're basically covered as far as SASE's on-hand. Thanks again to those of you who throw in a few extra bucks at renewal time. This helps cover "extra" costs like halftone reproductions, gasoline, office supplies, etc.

I have edited and published this newsletter since issue #33. I've enjoyed it because it keeps me in touch with a bit of technology, and mainly because I enjoy interfacing with people! The task is not without drawbacks, however. WU is a great vacuum cleaner for sucking up time! Between handling daily mail, maintaining a data base for financial inputs, banking, time on HF amateur nets to exchange information, layout and writing the actual WU pages, correspondence, time at the copy store, stapling, folding, stamping, return addressing, and mailing, I figure conservatively that WU absorbs at least 50 hours of my time per month.

HOW CAN YOU HELP? by taking to heart the following items in my 1988 Christmas Wish List to Santa!

1. Dear Santa. Please explain to **WU** subscribers that I require $7 per year **PLUS 12 SASE's!** When they get lazy and send me a $10 bill (and no SASE's), they are...in effect...expecting me to spend 30 minutes or more making up SASE's for them. I am worth more than $6 an hour!

2. Help contributors understand that I cannot do magic with crummy, smudged originals of articles and schematics! Have them use BLACK pen, NEW printer or typewriter ribbons. Ask them to be neat and proofread their work.

3. The original purpose of **WU** was to foster communication among experimenters, including current activities, plans for frequency changes, etc. In 1988 we have had numerous examples of new beacons, QSY's, outages, etc. which have not been reported to **WU**. While the FCC Part 15 certainly does not require experimenters to subscribe to **LOWDOWN, NO, or WU** as a prerequesite for using the 1750m band, it sure would reduce confusion if experimenters would at least notify one or all of these publications concerning their activity.

4. Oh Santa, by the way. If you could please get folks to appreciate what a pain it is to receive twelve SASE's in the mail, all of them glued shut due to moisture and humidity! This is a real bummer, and usually involves cutting off the stamps, and regluing them on fresh envelopes. Subscribers in humid climates could help by putting waxed paper between each flap on every SASE.

ZEBRA NEWS FOR WU#61 - by Mike Mideke, PO Box 123, San Simeon, CA 93452. November 29, 1988. Lots of new LowFERS on the air this fall! I'm often hearing 15 to 18 beacons during my short daytime listening sessions. Nighttime single hop skywave has been doing reasonably well but there have been some evenings when no signals have been heard despite quiet conditions and good NDB indicators.

REPORTS: LowFERS first heard after 10/23 include **B** 170.4 on 11/17, **ZIR** 178.935 on 11/27, **NRE** 180.7 on 11/17, **T** 184.8 on 11/20, **WJ** 185.4 on 10/30. NIGHT SKYWAVE since 10/23 included **MAX, 7FS, FAW, MPM, AZ, NRE.** DAY SKYWAVE: **7FS** QRK 3 at noon and 2pm on 11/24.

SOAPBOX--LF PUBLICATIONS: Lately we've been hearing a murmur of complaint about how thin **THE LOWDOWN** has become. At least until the latest postal increase, LWCA dues were sufficient to support 8 issues of 22 pages, and 4 of 60 pages each year. Looking through the past 12 issues of **THE LOWDOWN** I see we've received about 327 of a possible 402 pages, for a shortage of 75 pages. I believe the primary reason for this shortage has been a lack of submitted material, especially submissions in "camera ready" condition.

At a time when the 1750m newsletters are receiving more contributions than can be immediately published, it seems a shame that the excellent PUBLISHING resource afforded by **THE LOWDOWN** should languish for want of input. So I'd like to urge **Western Update** and **Northern Observer** subscribers to consider submitting some of their material for publication in **THE LOWDOWN.**

Articles should be selected for long-term relevance -- proven circuits and designs, helpful hints, theoretical and general background material designed to attract the beginner and tempt him to try things. Good stories, anecdotes, or historical perspectives would do a lot to liven up the magazine.

For optimum use of **LOWDOWN** space, submissions should be confined to a 7 inch by 11 inch field centered on 8-1/2" x 14" (legal size) paper. This works out to 1-1/2 inch margins top and bottom. Use 3/4-inch margins on the sides. At the top of each page, outside the margin, put your name, title of your article and the page number. Use a typewriter or printer with a good dark ribbon and clean print. Do diagrams and drawings with black ink. Avoid photographs unless you are willing to have halftones made. Look through a few issues of **THE LOWDOWN** and you will see how different sorts of originals come out.

Once your contribution goes to **THE LOWDOWN** it is unlikely to be proofed or corrected in any way, so check and double check your work. Get someone else to read the material over for you...they are almost certain to catch something you've missed! Mail your work to: Bill Oliver, 45 Wildflower Road, Levittown, PA 19057, and wait patiently. It sometimes takes many months for material to appear. In general, pieces 1 to 3 pages long will make it into the "regular" (nominal 22 page) issues, while longer articles may be reserved for the quarterly "superissues" that appear in January, April, July, and October.

The above comments make no pretense of offering a solution to underlying problems that have left the LWCA's publication looking a bit thin. For now I just want to point out how to use a somewhat neglected resource.

Another closely related issue is the fate of Sheldon Remington's **NDB DX NEWSLETTER**. Unless Sheldon receives practical assistance in the publishing and distribution aspects of this uniquely valuable publication, its latest issue will be the last. Having put out the first 32 issues of Western Update from a primitive location far from copy and postal services I can truly appreciate Sheldon's problems! This work deserves support. Surely we can organize our collective resources so that the minority committed to longterm creative projects don't have to do all their own printing, mailing and related bookkeeping as well!

73 - mike

H, H2 NEWS for WU #61 - by Frank Cathell, Box 535, Descanso, CA 92016.

As far as Lowfer antenna experimentation is concerned I have been fortunate in my rural location 40 miles east of San Diego. My wife and I live near the end of a small canyon with the property bordering on Cuyamaca State Park. The altitude is 3500 feet and the terrain is excellent for stringing antennas (trees in the right place, etc.) There is also little power line or man-made noise in this location so I decided some months ago to take advantage of the situation for the reception of Lowfer beacons. I had been using the two long wire ham antennas, one 500' long and the other 400', for long wave reception. My "DX" catches with these antennas last year included SUK, NVA, FLI, and Z2. I also recently purchased an LF Engineering L-400B active antenna (about 2 feet long) which I had intended for portable LF activity.

After an extensive comparison of the L-400B with the two wire ham antennas, I was impressed! The active antenna (placed in the clear) outperformed the wires in almost every case. I even extended the 500' wire to 750' but the active antenna performance was equal to or superior.

I finally decided to go for broke and picked up several thousand feet of insulated hook-up wire at the local swap meet. I managed to layout approximately 3000' of wire in a north/south direction along a ridge in the state park wilderness area behind the house. The wire was loosely strung from bush to bush about 4 feet above the ground. The antenna was fed on the end with about 100' of RG-58U coax directly. I was reluctant to bring the end of the wire directly into the house for fear of ac noise pickup. A series resonant tuner was used between the coax and receiver to prevent possible intermodulation problems.

The preliminary results were phenomenal! I copied MPM and FAW in Utah (about 600 miles) the second night and have heard them several times since. PLI, B, and R move the S-meter most of the time. NRE and M (San Diego beacons) are copyable day and night. IZJ, FPV, WJ, ZIR (LA area), and C (Morro Bay) can be heard most of the daylight hours and frequently at night. I just recently copied HDOMBAY and Tucson's AZ.

Additional experimentation has confirmed Mike Mideke's finding that the wires tend to be directional along their axis. Unlike HF antennas which are 1/4 or 1/2 wavelength long, the LF wires do not perform very well to broadside signals for some reason.

So, if you want to hear consistant Lowfer DX, move to the country and get plenty of wire. If you live in the city and can't get more than 1000' of wire out, you're better off either building or buying an active low frequency antenna such as the L-400B or the Burhans A-86 active whip. If you are trying to use your 80 or 160 meter dipole antenna for LF, you may try grounding your receiver's antenna terminal - it may work better!

MEDIUM FREQUENCY TRANSMITTING

By Steve McGreevy

As lowFERS, we operate license-free under the provisions of Part 15, Subpart D, Section 15.112 of the F.C.C. rules (see fig. 1) which allow for a maximum of 1 watt input to the final and an antenna of not more than 15 meters in length within the 160-190 KHz, 1750 Meter "band". Many of us have experienced the best and worst case accomplishments of operating under the above provisions and have amassed great knowledge and experience as lowFERS.

The F.C.C. has blessed us radio types with other license-free provisions for low-power operating within the medium-frequency spectrum, also under Part 15, Subpart D. Section 15.113 of the F.C.C. rules allow for an antenna (including "ground lead") of not more than 3 meters in length in the spectrum from 510-1705 KHz (see fig. 1).

Many of us (I have) probably at one time or another built one of those "Wireless Mic" A.M. transmitter kits that could be used to "broadcast" to a nearby standard broadcast receiver. Little kids love them. They sure didn't transmit very far on the small hank of wire usually supplied with the kit and we probably weren't aware of Part 15.

Despite the proliferation of such kits, few ever used them for serious experimentation and DX purposes. They were merely toys. Alas, too few people have ever taken maximum advantage of Sec. 15.113 to the extent as we lowFERS have done with Sec. 15.112, and therein exists new territory for experimentation, from antennas to the study of MF propagation vagaries.

While a great deal of experimentation in the MF spectrum could parallel our efforts on 1750 Meters, an added advantage (among others to be discussed shortly) is the existance of a huge pool of broadcast-band receivers, the vast majority of them of consumer grade. Since practically every household has at least one of these receivers, our efforts in the MF spectrum could include neighbors and other family members, were one to create a low-power broadcast station serving a few square blocks in area.

Cheapie broadcast radios also make for handy "field strength" meters, as one can walk, bike, or drive a quarter mile, half mile, or more to see if modifications in the antenna system have made the signal better (or worse). The keyed carrier of a beacon signal can be heard in BFO-less radios as a keyed "hiss", with or without "key-clicks". Car radios are superb for mobile signal strength observations of this sort, and it is simple to add a BFO to most car receivers.

The MF spectrum poses certain advantages and disadvantages over the 1750 Meter band. Ionospheric propagation is more dominant on MF frequencies than on LF as the primary factor in medium and long-distance signal reception (100-1300+ mi. distances) at power levels of one watt and under. This is especially true for the frequencies of 1600-1700 KHz, which are "borderline HF" type frequencies, subject to F-layer propagation as readily as the E-layer propagation more dominant in the below-500 KHz spectrum. This fact certainly complicates the study of MF propagation, but makes it as fascinating as the various LF propagational modes.

Noise, both of the natural kind associated with electrical storms (QRN) and the many types of man-made noise (QRM), is substantially less of a problem in the MF spectrum than on LF for the most part. That doesn't necessarily mean the MF frequencies will be any "quieter" on any given night than LF, because the QRN may be propagated more favorably on MF than on LF. Also, powerline noise from certain sources resonant to MF may make the noise worse there. But generally, the "MF is quieter" rule holds true.

Short-term propagation variations (fading) are more evident in the MF spectrum than on 1750 Meters, (more so on the "top-end" frequencies of 1600-1705 KHz than on the "bottom-end" frequencies around 520 KHz). The fading rate is faster, on the order of a few minutes to as little as a few seconds between fade cycles (similar to the lower HF spectrum). We know 1750 Meters and the NDB band generally exhibit longer fade cycles of approximately 5-20 minutes per the results of Mike Mideke's "SIMS" results (THE LOWDOWN, April 1988, pg. 10; May 1988, pg. 10). Observations of 1750 Meter listeners and my own observations on both LF and MF over the past 9 years verify those findings. Those attempting one or two-way communication endeavors should keep in mind the generally faster QSB rate on MF.

Longer-term propagation variations roughly parallel LF, with conditions hinging on solar disturbances, diurnal variations on nighttime path signals, 27 day propagation cycles, and so on.

Since the Part 15 provisions limit the length of the antenna and result in a very small antenna as a percentage of the radiated signal's wavelength, antenna efficiency becomes a critical factor in obtaining maximum signal radiation from the "tiny" antenna. Our 50 foot (15 meter) antenna on 175 KHz is only .0088 of a wavelength long. Most lowFER antennas don't even approach 50 feet in length. 35 feet seems to be the average height, which comes out to about .0066 of a wavelength at 175 KHz.

The short antenna syndrome is not much better at MF, although the "MF-high" frequencies (1600-1700 KHz) have a big advantage in that regard. At 1635 KHz (1714.29 meters in w.l.), a 3 Meter antenna will be .016 wavelength, while at 520 KHz (576.9 meters) the same 3 meter antenna will be only .0052 of a wavelength, smaller in terms of wavelength than the legal antenna at 175 KHz. So, it looks like the 1600-1700 KHz region would be better for highest antenna efficiency. Getting the antenna in the clear away from foilage, structures, and other obstructions should be the prime goal when the antenna system is constructed. All "good practices" for LF transmitting undoubtedly apply to MF transmitting too!

I haven't mentioned ground systems, but it's safe to say that even though a good ground system is highly important at frequencies in the 1600-1700 KHz region, it is not as crucial as it is in the LF spectrum (1750 Meters). It should be noted that an efficient LF ground will perform tremendously on MF, therefore LF transmitting ground-system techniques should be applied to MF transmitting as well.

There are substantial disadvantages to Part 15 transmitting in the MF spectrum. First, the frequencies between 525 and 1620 suffer from extreme A.M. broadcast station modulation "splatter", especially during the nighttime hours when skywave signals fill up the entire band with giant signal levels, rendering weak signal work nearly impossible and futile at best. Fortunately, broadcast station modulation splatter is largly absent above 1620 and below 520 KHz.

A 20 KHz "buffer zone" above and below the edges of the A.M. broadcast band carrier limits should be respected and avoided if one intends to do weak signal work with C.W., BPSK, etc. There exists a fair percentage of poorly engineered, over-compressed and overmodulating broadcast stations on 540 and 1600 which can splatter excessively at times--products of de-regulation and lowered standards. These "dirty" broadcasters emit sideband splash extending up to 20 KHz on each side of their carrier frequency.

Not to be overlooked, 530 and 1610 KHz are occupied by "travelers information" (or "T.I.S.") stations. These are low-powered (usually under ten watts) with either buried-wire antennas or short vertical base or center loaded "whip" antennas situated at strategic locations where motorists may desire traffic reports, parking lot information, campground information, etc. If one is located close to a T.I.S., there may be side-band splatter from it also.

However, the situation is much more favorable for weak signal work between 510 and 525 KHz which is largely occupied by aeronautical navigational beacons (NDB's) similar to ones between 200 and 420 KHz. It is possible to locate the frequency of a MF C.W. "MEDfer" beacon between the navigational beacon carrier/ident "cluster" frequencies, which tend to fall on full KHz frequencies (520.0, 521.0, 522.0, 523.0, etc.) plus or minus 50 Hz. Narrowband receiving techniques would ensure lots of "wide open space" between the "clusters". My own MEDfer beacon, "SA" on 522.62 KHz has practically no QRM from the aeronautical beacons on surrounding frequencies when narrow filters, I.F. and/or A.F., are exploited in the receiving system.

The frequencies between 1620 and 1705 have even more "wide open spaces", as most of the former occupants of this range have vacated in advance of the expansion of the A.M. broadcast band to 1700 KHz. It remains to be seen if this BCB expansion ever comes to fruition. What does remain are a few odd sounding utility signals that beep, chirp, or squawk, and an occasional navigational C.W. beacon. In any case, these signals are few and far between.

Groundwave coverage is much less on MF than LF, especially above 1600 KHz. This fact of geophysics combined with the 100 milliwatt power limit greatly limits useful groundwave coverage. While a "good" LF C.W. beacon system may have a useful groundwave signal out to 300 miles; a 520 KHz, 100 milliwatt C.W. beacon may not be heard very far beyond 50 miles or so, and a 1650 KHz beacon of the same power may not get beyond 20 miles in its groundwave coverage. These distance figures are for quiet locations and sensitive (beverage antenna or elevated active whips/loops) receiving set-ups and are educated guesses based on my listening experiences.

So, the MF frequencies are characterised by a small groundwave coverage area but a potentially large skywave coverage area under exceptional propagation conditions, and this is where much excitement can arise for DX types such as myself. In any case, the signals from a Part 15 MF installation are going to be tiny indeed. To hear them is not a task for the casual listener!

FIG. 1.

Subpart D—Low Power Communication Devices: General Requirements

SOURCE: 40 FR 10677, Mar. 7, 1975, unless otherwise noted.

[¶ 5750]

§ 15.101 Introduction.

A low power communication device may be operated pursuant to the provisions in this subpart or pursuant to the separate provisions for the specific device in Subpart E of this part.

§ 15.102 Cross reference.

The provisions of Subparts A and B of this part and Subpart J of Part 2 of this chapter shall apply to the operation of all low power communication devices.

[¶ 5751]

§ 15.103 Interference.

Notwithstanding the other requirements of this part, the operator of a low power communication device, regardless of date of manufacture, which causes harmful interference to an authorized radio service, shall promptly stop operating the device until the harmful interference has been limited.

[¶ 5752]

§ 15.104 Eavesdropping prohibited.

As provided in § 15.11, the use of a low power communication device for eavesdropping is prohibited.

[¶ 5753]

§ 15.105 Class B emission prohibited.

Operation of a low power communication device that produces Class B emissions (damped waves) is prohibited.

[¶ 5755]

§ 15.111 Operation below 1600 kHz.

A low power communication device may be operated on any frequency between 10 and 490 kHz or between 510 and 1705 kHz subject to the condition that the emission of RF energy on the fundamental frequency or any harmonic or other spurious frequency does not exceed the field strength in the following table.

Frequency (kHz)	Distance (meters)	Field strength (uV/m)
10 to 490	300	2400 / F(kHz)
510 to 1705	30	24000 / F(kHz)

[40 FR 21030, May 15, 1975; 49 FR 7810, Mar. 2, 1984, as amended at 51 FR 4366, Feb. 4, 1986]

§ 15.112 Alternative provisions for operation between 160 and 190 kHz.

In lieu of meeting the requirements of § 15.111, a low power communication device may operate on any frequency in the band 160—190 kHz provided it meets all the following conditions:

(a) The power input to the final radio frequency stage (exclusive of filament or heater power) does not exceed one watt.

(b) All emissions below 160 kHz or above 190 kHz are suppressed 20 dB below the unmodulated carrier.

(c) The total length of the transmission line plus the antenna does not exceed 15 meters.

§ 15.113 Alternative provisions for operation between 510 and 1705 kHz.

In lieu of meeting the requirements of § 15.111, a low power communication device may operate on any frequency in the band 510—1705 kHz provided it meets all the following conditions:

(a) The power input to the final radio stage (exclusive of filament or heater power) does not exceed 100 milliwatts.

(b) The emissions below 510 kHz or above 1705 kHz are suppressed 20 dB or more below the unmodulated carrier.

(c) The total length of the transmission line plus the antenna, plus the ground lead (if used) does not exceed 3 meters.

(d) Low power communication devices obtaining their power from the lines of public utility systems shall limit the radio frequency voltage appearing on each power line to 200 microvolts or less on any frequency from 510 kHz to 1705 kHz. Measurements shall be made from each power line to ground both with the equipment grounded and with the equipment ungrounded.

[Amended at 51 FR 4366, Feb. 4, 1986]

§ 15.114 Operation between 1.705 and 10 MHz (including swept frequency).

A low power communication device, including one which utilizes swept frequency techniques, may be operated in the 1.705 to 10 MHz band, provided it meets the following requirements:

WESTERN UPDATE ACTIVE LIST as of December 3, 1988

Anderson	Brice	BA	W9PNE	PO Box 14	Lancaster	IL	62855	(618)299-2441
Armstrong	Lloyd			3813 Lancaster Drive	Pueblo	CO	81005-3065	
Babcock	David		WA6EBH	2940 Cheyenne Road	Riverside	CA	92506	
Bahr	Leland	LEE	W0VT	914 Golden Bear Lane	Kingwood	TX	77339-2914	(713)359-5284
Baker	Brad			21024 Bear Creek Road	Los Gatos	CA	95030	
Balfour	Herb	OHH	VE3OHH	91 Elgin Mills Road West	Richmond Hill (Canada)	ONT	L4C4M1	(416)884-5355
Barlow	Ron		N4GJV	Route 1, Box 297	Cleveland	NC	27013	
Bauer	Frank	FB	W6FPO	PO Box 1086	Felton	CA	95018	(408)335-7392
Bittner	Mike			27215 Sunnyridge Road	Palos Verdes	CA	90274	
Bond	Robert		WD6BCN	1420 McLoughlin Avenue	Oxnard	CA	93035	(805)985-0159
Borglum	James			5549 Lesa Road	La Mesa	CA	92041	(619)464-3250
Bowers	William			11542 South Kirkwood	Stafford	TX	77477	(713)530-4364
Bradley	Dave		W6CUB	PO Box 23922	San Jose	CA	95153	
Brady	Aaron	QH		41458 N. 50th St. West	Quartz Hill	CA	93536	(805)943-1580
Bumpus	Carle			930 Idylberry Road	San Rafael	CA	94903	
Burhans	Ralph			161 Grosvenor Street	Athens	OH	45701	(614)593-8207
Buttschardt	Cliff	HDOMBAY, C	W6HDO	950 Pacific Street	Morro Bay	CA	93442	(805)772-2132
Carter	Max	MAX		46 - 14th Street	Wheatland	WY	82201	(307)322-9439
Cathell	Frank	H, H2	K3YAZ	PO Box 535	Descanso	CA	92016	(619)445-8167
Coote	James	J	WB6AAM	808 North Ave. 66	Los Angeles	CA	90042	(213)258-7490
Costa	Bob		KB6QXM	P.O. Box 600	Redwood Estates	CA	95044	(408)353-3656
Cripe	David			7908 Wellesley Court	Pasadena	MD	21122	
Curry	David	PLI	WD4PLI	4415 Cahuenga Blvd.	Toluca Lake	CA	91602	(818)760-0213
Cutter	Robert	CO	KI0G	701 19th Street	Glenwood Springs	CO	81601	
DeVaughn	Bob	NBD	K3NBD	829 Estella Street	Pittsburgh	PA	15210	(412)488-1479
Eatough	Charles		W6UTN	610 Palacia Court	Turlock	CA	95380	
Ericson	Jim	EK	KG6EK	226 Charles Street	Sunnyvale	CA	94086-6063	(408)773-8947
Farkas	Greg	AZ	AK7Y	PO Box 17074	Tucson	AZ	85731-7074	(602)749-4796
Farnsworth	Charles			506 Rutledge Drive	Lodi	CA	95240	
Faulkner	Charles	FPY	W6FPY	15844 McKeever	Granada Hills	CA	91344	(818)366-6210
Fisher	Montie		WA5TSL	808 Brett Drive	Edmond	OK	73013	
Forsman	Stan			1312 Burrows Road	Campbell	CA	95008	(408)374-2129
Hedspeth	Scott	N3S	WB4YZA	Route 4, Box 146	Mocksville	NC	27028	(704)284-4021
Holland	David	DCH	K3YAY	300 South Main Street	Berlin	MD	21811	
Hooper	William		KF6AR	366 S. El Monte Road	Los Altos	CA	94022	
Horton	Bob	MSG	W6MSG	2 Fresno Street	Paso Robles	CA	93446	(805)238-2250
Humphrey	Lee		WD5BTU	Rt. 2, Box 449	Jasper	TX	75951	(409)384-9489
Isbell	Daryl		KB5EDW	Box 2146 C.S.	Socorro	NM	87801	(505)835-1395
Johnson	Dave	F		713 Texas Ave.	Los Banos	CA	93635	(209)826-0841
Johnson	David		WB7ACG	PO Box 15646	Rochester	NY	14615-0646	(716)235-1104
Johnson	Don	AU	W9TIF	3304 Roxford	Champaign	IL	61821	(217)398-4020
Johnston	David	9HDQ	K9HDQ	RR1, Box 108C	Daleville	IN	47334	(317)354-2884
Jones	Ron		K7RJ	9241 S. Toni Lee Circle	West Jordan	UT	84088	(801)561-2685
Jones	Wallie		W6SZQ	9090 Nagle Ave.	Arleta	CA	91331	(818)892-0552
Kassel	Charles			114 Church Drive	Mastic Beach	NY	11951	
Keeley	Roy			Route 3, Box 316 Salt Air Rd.	Theodore	AL	36582	(205)973-2516
Keller	Eb			2984 Fallwood Lane	San Jose	CA	95132	(408)263-6229
Kincaid	Nilan		W6EIG	5529 W. 140th Street	Hawthorne	CA	90250	(213)643-5269
Knight	David			4240 Fay Road	Syracuse	NY	13219	
Kraus	Howard	K2UD		372 Callodine Avenue	Amherst	NY	14226	
Layer	Hal		N6SPD	PO Box 27676	San Francisco	CA	94127	(415)661-6958
Lee	Mitchell	MEL	KB6FPW	172 North 24th Street	San Jose	CA	95116	(408)298-3026
Leonardelli	John		VE3IPS	Box 722, Station A	Downsview (Canada)	ONT	M3M3A9	(416)636-3300
Lundgren	Carl	TH	W2AZQ	60 Woodhollow Road	Colts Neck	NJ	07722	(201)842-4780
Mallory	Mark	MPM	WB7CAK	5196 Cobblecreek Road #7K	Salt Lake City	UT	84117	
Manley	Dean		KH6B	2058 Ainaola Drive	Hilo	HI	96720-3638	(808)959-8257
Marineau	Patrick		K9HF	3443 Illinois Avenue	St. Louis	MO	63118	
Marshall	Dave			440 Larry Drive	Florissant	MO	63033	

Martin	Steve		NK3R	141 Bridgecreek Drive	Goose Creek	SC	29445	(803)797-3143
Mawhinney	Scott	dashes		295 Pettis Avenue	Mountain View	CA	94041	(415)960-1041
Maxwell	James		W6CF	PO Box 473	Redwood Estates	CA	95044	(408)353-2094
McGreevy	Steve	TLX, TMT	N6NKS	45 Elda Drive	San Rafael	CA	94903	(415)479-4259
Mideke	Mike	ZV	WB6EER	Box 123	San Simeon	CA	93452	
Morgan	Robert		KA0FTA	2817 West St. Anne	Rapid City	SD	57702	
Nickerson	Rick	R	KB6JQU	3224 Saxonville Way	Sacramento	CA	95842	(916)348-1466
Olson	Keith	7FS	W7FS	E 15470 Highway 106	Belfair	WA	98528	(206)275-2560
Otacilio P. de Sousa	Jose			Rua Calisto 62, Recanto dos Vinhais	Sao Luis, MA, Brasil		65070	
Owens	James	Q	NW0O	1363 Tipperary	Boulder	CO	80303	
Paschal	Ev			Sinclair Island	c/o Anacortes	WA	98221	
Pepe	Bill		WA2TDP	Box 1915	Bloomfield	NJ	07003	
Peterson	Art			851 31st Street	Richmond	CA	94804	(415)234-2014
Phillips	Ed	IZJ	W6IZJ	408 North Alabama Street	San Gabriel	CA	91775	(818)285-8308
Pomer	Zvi		4X1KT	5703 Caminito Norte	LaJolla	CA	92037	
Pomplun	Don		K2BIO	521 Van Buren Place	San Ramon	CA	94583	(415)829-7648
Post	Kendall			1842 Hoffman Street	Madison	WI	53704	(608)244-0500
Raney	David	UPN	WC8E	4128 Linden Avenue	Cincinnati	OH	45236	(513)791-0740
Rappold	Sam	ZYK	WB6ZYK	PO 1267/479 Briceland Road	Redway	CA	95560	
Ratzlaff	Steve	SR	AA7U	900 Henderson / 60A	Sunnyvale	CA	94086-9059	(408)248-0343
Raven	Gregory	TEXAS	KF5N	4550 Sunnybank Court	Fort Worth	TX	76137	(817)485-6771
Reid	Frank		W9IIKY	Box 5283	Bloomington	IN	47407-5283	
Remington	Sheldon	HO	NI6E	PO Box 2094	Pahoa	HI	96778	
Roberts	Todd	ABC	WD4NGG	PO Box 1413	Hilton Head Island	SC	29925	(803)681-8114
Satterthwaite	Ed			4139 Willmar Drive	Palo Alto	CA	94306	
Schick	D.H.			580 N Buena Vista Dr	Lake Alfred	FL	33850	
Schumacher	Jon	NYA	K7NY	Star Rt, Box 55255	Pahrump	NV	89041	
Seamons	John	JKS	KF6YO	95 Holstein Road	San Anselmo	CA	94960	(415)456-6090
Seden	Randy	ELU	WD6ELU	1272 Harold Avenue	Simi Valley	CA	93065	(805)583-5687
Sethman	Bob			92 Allen Plan	Donora	PA	15033	
Skillin	Boyd		K6MGX	3876 East Pico	Fresno	CA	93726	(209)222-0275
Smith	Glen		N6CX	220 Laurel, POB 475	Kenwood	CA	95452	
Smith	Randy			19515 Frederick Rd. #135	Germantown	MD	20874	
Snow	John		N6AMZ	3708 Judah Street	San Francisco	CA	94122-1227	
Spaulding	Fred		K1YQP	883 San Simeon Drive	Mountain View	CA	94043	(415)961-5018
Spencer	Chris	FAW	WB7FAW	722 West 1850th North	Orem	UT	84057	(801)225-7852
Statom	Mike			1604 S. Campbell Avenue	Alhambra	CA	91803	(818)289-7170
Stewart	Don			2617 Anza Street	Bakersfield	CA	93305	(805)871-7024
Stinson	Dave	R, NTS	AB5S/7	3550 Paradise #740	Las Vegas	NV	89109	(702)732-4069
Sullivan	John			2069 Touraine Lane	Half Moon Bay	CA	94019	
Taylor	Al			112 Cook Road	Whitehorn	CA	95489	(707)986-7775
Thompson	Arliss	XU	W7XU	RR#3, Box 224	Sioux Falls	SD	57106	(605)368-2305
Tracy	John		WB7AMC	10431 Miller Avenue	Cupertino	CA	95014	(408)257-9585
Turner	Clint	CT	KA7OEI	132 West 2800 South	Bountiful	UT	84010-6447	(801)298-3393
Vanderbeek	Herb	G, Y, 8-dits	WY6G	630 Ashton Avenue	Palo Alto	CA	94306	(415)493-1726
Vandermaaten	Jim	SM	WB6QZL	1276 Tourney Drive	San Jose	CA	95131	(408)258-6872
Waldsmith	Gary	SUK	K4SUK	3550 Ridgeview Drive	Eldorado Hills	CA	95630	(916)933-3815
Weiss	Jim		W9ZMY	c/o Radio WTAQ	LaGrange	IL	60525	(312)579-9104
Welch	James		KK6N	3071 Mauricia Avenue	Santa Clara	CA	95051	
Whipple	Dan			11726 Norway Street	Coon Rapids	MN	55433	
Wright	Rick	1SUN	KA5YWH	Box 4181, Station A, SEOSU	Durant	OK	74701	(405)924-3699
Wyatt	Frank		N6FW	855 Ticonderoga Drive	Sunnyvale	CA	94087	(408)737-8155

EK NOTES: Last minute news on publication day (December 6th)---**Max Carter** dropped me a short postcard stating, "Everybody hears FAW except me, right? Until Nov. 10, that is. Finaly copied **FAW** very weakly here at 1225Z. Also, been trying lately for new beacon **XU** 180.800 khz (Arliss Thompson, Sioux Falls, SD), so far without success. No west coast beacons heard."

See you all in January with another issue. We are running close to "dry" as far as material to publish is concerned. Technical articles, photos, ideas, comments...are all appreciated!

Don't forget the **LowFER ham nets** in California. Sunday mornings 7:30am on 3927 kHz. Thursday evenings around 8pm on 1987.5 kHz. Join us!

For those of you in the Midwest and East, don't forget about **Herb Balfour's** fine LowFER newsletter Northern Observer. Available for $10 (US) yearly, plus 12 business size self addressed envelopes (Herb will affix Canadian postage): Herb Balfour, 91 Elgin Mills Rd. West, Richmond Hill, Ontario L4C 4M1, Canada. For general news of experimentation and DX-ing below 550 kHz, subscribe to THE LOWDOWN, $12 annually, c/o **Bill Oliver**, 45 Wildflower Road, Levittown, PA, 19057. 73, Jim. ☺